

## CLIMATOLOGICAL DATA FOR FEBRUARY, 1913.

## DISTRICT NO. 3, OHIO VALLEY.

Prof. FERDINAND J. WALZ, District Editor.

## GENERAL SUMMARY.

The weather conditions which obtained throughout the Ohio Valley during February, 1913, are notable (1) for the large number of clear and pleasant days, (2) the large amount of sunshine for the season of the year, and (3) for the absence of severe winter storms and cold waves usual in the month of February. Also, over the southern half of the district, the month was notable for the small amount of snowfall. The month from the point of view of weather conditions easily divides into two distinct and nearly equal parts, namely, a cold half and a warm half. During the first 14 days, while there were no unusually low temperatures experienced, yet temperatures were universally below normal, and over the more northerly sections there was considerable snow. During the last half of the month, except on 2 days, temperatures were generally above normal, and on several days they were remarkably high for February; also during the last week rains were general and in some sections heavy.

The month was unusually favorable for outdoor pursuits and there was no interruption to traffic. In Tennessee and the sections of the district to the southward considerable plowing was done, and in many localities farmers finished sowing oats. At the end of the month trees and shrubs were budding and crocuses and several other species of flowers had appeared.

The only general storm passing over the district worthy of special notice occurred near the end of the month. A deep barometric disturbance, which had developed over the southern Rocky Mountain slope about the 25th, moved during the 26th into northern Texas and extended into the Mississippi Valley on the 27th. As a storm of marked energy, it swept over the central Mississippi and Ohio Valleys, attended by rains, thunderstorms, and moderately high temperature, and was followed by a sharp change to colder weather. It passed out over the Atlantic States during the 28th.

The following table summarizes the chief features of meteorological interest for the several sections of the district:

Portions of States included in the Ohio River Basin.	Temperature.				Precipitation.						
	Average.	Departure.	Highest.	Lowest.	Average.	Departure.	Greatest monthly.	Least monthly.	Greatest in 24 hours.	Average number of days.	Average.
New York.....	23.4	+1.5	62	-11	2.28	+0.33	2.47	1.99	0.88	9	9.5
Pennsylvania.....	26.5	-2.6	67	-9	2.09	-0.97	3.03	0.88	1.20	11	7.0
Maryland.....	27.0	+1.1	62	0	2.49	-1.08	2.59	1.33	1.00	10	6.4
West Virginia.....	32.6	+0.6	80	-4	2.48	-0.77	6.15	1.10	1.81	9	4.9
Ohio.....	28.0	-0.4	77	-15	1.99	-0.84	3.22	1.11	1.65	8	4.8
Indiana.....	28.3	-1.2	72	-10	1.61	-1.41	2.85	0.75	1.22	7	5.5
Illinois.....	29.3	-0.8	72	-18	1.29	-1.38	2.92	0.94	0.94	7	5.5
Kentucky.....	34.8	+0.1	77	-2	2.94	-0.88	4.88	1.61	2.16	7	1.4
Tennessee.....	39.9	+0.5	75	5	4.84	+0.41	6.55	2.51	4.00	7	T.
Alabama.....	40.7	+0.8	73	10	5.66	+0.24	7.00	4.06	3.77	7	0
Georgia.....	42.5	+1.7	65	17	6.23	-1.42	7.00	2.34	6	T.	
North Carolina.....	38.2	+1.0	72	27	4.49	-0.58	7.65	1.59	2.80	7	T.
Virginia.....	35.3	+1.4	67	0	3.05	-0.75	4.77	1.97	1.60	8	1.7

## TEMPERATURE.

The unseasonably high temperature which prevailed so largely through nearly the whole of January, ter-

minated suddenly with the close of that month and February was ushered in with the coldest weather of the winter up to that date. The average temperature of the first day ranged from 6° to 21° below normal at the various Weather Bureau stations and temperatures were below normal continuously during the first half of the month. The lowest temperatures of the month (and of the winter) occurred as a rule either on the 6th or the 13th. At quite a few stations, however, the lowest temperature was registered on the morning of the 1st. From the 15th to the 22d, inclusive, the weather was unusually warm for the season, and on several days during that period temperatures were remarkably high, notably the 18th, 19th, 20th, and 21st, when maximum temperatures registered in the 60's and 70's. Cold weather followed in the period 23d-25th, but warm weather again obtained generally on the 26th and 27th, and in the southeastern part of the district on the 28th, although a marked change to colder had set in over the remainder of the district on the latter date.

The average temperature of the month as a whole was slightly below normal for the sections north of the Ohio River and over western Pennsylvania, but was above normal over western New York, western Maryland, and over West Virginia and other sections south of the Ohio River. The excess, however, while only 0.1° for Kentucky, increased gradually to the southward and to the eastward of that State. The highest temperature in the district during the month, 80°, was registered at Charleston, W. Va., on the 21st. The lowest, -18°, occurred at Philo, Ill., on the 6th; but this temperature is 8° lower than the minimum at other stations in Illinois during the month and is 9° lower than the minimum registered on the same day at the University of Illinois, 12 miles distant. This variation is doubtless due in a large measure to topographical differences. The next lowest temperature in the district, -15° at Milligan, Ohio, occurred on the 6th also.

## PRECIPITATION.

There was a slight excess in the total precipitation of the month over western New York, Tennessee, and northern Alabama, but a deficiency in all other sections of the district, the shortage ranging from 0.58 inch for western North Carolina to 1.41 inches for central and southern Indiana. Over Tennessee and sections of the district bordering on the south, and where the precipitation was practically all in the shape of rain, the total amounts at the various stations ranged between 4.0 and 7.6 inches, while over the rest of the district the aggregate amounts of rain and melted snow were generally less than 3.0 inches. Over much of Illinois, Indiana, and western Ohio precipitation measured less than 2.0 inches, and at a few stations in north-central Indiana less than 1 inch.

*Snowfall.*—Over the States north of the Ohio River and in western Pennsylvania and western New York there was about the normal amount of snow and it covered the ground most of the first half, the cold part, of the month. In West Virginia snowfall was light and unimportant,

except at a few stations. In Kentucky the number of days with snow and the total fall for the month were both notably small, while over all the district south of that State, except in the elevated sections of southwestern Virginia, no measurable amount of snow fell at any station.

The most important precipitation periods were (1) the 3d-4th, when moderately heavy rains fell over southern sections, rain and snow in Kentucky and snow over northern and eastern sections; (2) the 11th-12th, when heavy rains again fell over southern sections and rain or snow or both over central and northern sections; (3) the 20th-22d, when rains were general over the district but heavy only in western North Carolina; and (4) the 26th-28th, when precipitation, mostly rain, was general and heavy over the entire Ohio River Basin. Excessive 24-hour rainfalls occurred the 26th-27th at a majority of the stations in northern Alabama, at many stations in Tennessee, and at several stations in North Carolina.

#### MISCELLANEOUS.

Thunderstorms were quite general in Tennessee, northern Alabama, and western North Carolina during the 26th-27th. Also a thunderstorm occurred at Mount Sterling, Ky., the 22d. No damage resulted from any of these storms, except that excessive rainfall washed farm lands in some localities in Tennessee and Alabama, and small streams were put over their banks; also lightning struck and partly destroyed a residence at Roberson Fork, Tenn. Sleet storms on the 27th and 28th caused considerable trouble, mostly to telephone and other electric service wires, in the north-central counties of Ohio.

#### RIVERS AND FLOODS.

The water in the lower Ohio River and in a few of its lower tributaries near their mouths was above flood stage at the beginning of the month, the January floods not having run out in those sections. But by the 8th the flood waters had subsided even at Cairo. The flood damage in the Cairo River district is estimated to be \$350,000, and in the Evansville district about the same amount.

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#### THE HUMIDITY OF AIR IN MINES.

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The character of mine air is one of the numerous problems which have been studied by the Illinois State Coal Mining Investigation. This investigation has been carried on during the past two years by the Department of

Mining Engineering of the University of Illinois acting in cooperation with the United States Bureau of Mines and the State Geological Survey of Illinois.

It had been assumed previously that in winter the ventilating current in a mine absorbed moisture from the coal dust on the ribs, roof, and floor of entries and thereby rendered this dust more explosive. It also had been assumed that in summer approximately as much moisture was deposited in a mine as was extracted in winter. These assumptions were based on the theory that the degree of saturation of aqueous vapor varies directly with the temperature. Outside air with 100 per cent relative humidity at a temperature of 20° F. after entering a mine and having its temperature raised to the average winter mine temperature of 62° F., has only 20.1 per cent relative humidity.

To determine precisely the amount of moisture extracted or deposited by the ventilating current, hygrometers were installed in 20 mines in the State and for 12 months three readings a day were taken from each hygrometer. Two hygrometers were installed in each mine; one in the intake and one in the return. The United States Weather Bureau cooperated in the study of this problem, installing hygrographs at five of its stations. These stations were so situated geographically that the bihourly hygrometric records from them furnished data on the condition of the outside air in all mining districts in the State.

The hygrograph and hygrometer readings show that the amount of moisture deposited by the ventilating current in summer does not equal the amount extracted in winter. The coal dust in a mine becomes drier each year. This fact is well illustrated by the following records chosen at random from mine No. 70. Approximately 100,000 cubic feet of air per minute passes through this mine. For the week beginning March 17, 1912, an average of 9,861 gallons of water per 24 hours was extracted from the mine by the ventilating current. For the week beginning August 18, 1912, an average of 2,698 gallons of water per 24 hours was deposited in the mine.

It was hoped that the work of calculation might be shortened if from the bihourly hygrometric data supplied by the United States Weather Bureau stations some 2 hours could be determined whose average temperature and humidity closely approximated the average temperature and humidity for the 24 hours. After repeated trials it became evident that for Illinois no such approximation could be made but that any occasional coincidence between the average relative humidity and temperature for 24 hours and the average of any 2 selected hours such as 8 a. m. and 8 p. m. was purely accidental.

Reports on the work done may be obtained, when published, from the Illinois State Coal Mining Investigation, 126 Natural History Building, Urbana, Ill.









TABLE 1.—*Climatological data for February, 1913. District No. 5—Continued.*

Stations.	Counties.	Elevation, feet.	Length of record, years.	Temperature, in degrees Fahrenheit.						Precipitation, in inches.				Sky.	Prevailing wind direction.	Observers.				
				Mean.	Departure from the normal.	Highest.	Date.	Lowest.	Date.	Greatest daily range.	Total.	Departure from the normal.	Greatest in 24 hours.	Total snowfall, unmelted.	Number of rainy days, 0.01 inch or more.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.		
<i>North Carolina—Contd.</i>																				
Blowing Rock.....	Watauga.....	4,090	12 <sup>4</sup>	35.8	- 2.3	59	22	12	9†	37	4.63	- 0.33	2.00	0	5	18	2	8	n.	E. G. Underdown.
Brevard.....	Transylvania.....	2,230	12	35.8	+ 2.3	59	22	12	9†	37	6.76	+ 1.28	2.43	0	11	16	1	11	nw.	W. E. Breese.
Bryson City.....	Swain.....	2,000	25								4.13		2.05	0	5	19	4	5	nw.	D. K. Collins.
Cullowhee.....	Jackson.....	2,100	3	40.4		68	18†	11	13	45	4.13	- 1.66	1.43	0	6	16	8	4	nw.	Frank H. Brown.
Hendersonville.....	Henderson.....	2,167	16	39.9	+ 2.4	69	22	15	13	40	4.13	+ 0.35	2.80	0	6	16	8	4	nw.	Dr. L. B. Morse.
Highlands.....	Macon.....	3,850	23	37.0	+ 1.9	60	22†	15	9†	35	7.65	- 0.84	2.80	0	6	12	11	5	w.	T. G. Harbison.
Hot Springs.....	Madison.....	1,326	15	40.6	- 1.2	72	27	14	13	39	2.56		1.87	0	8	12	2	14	w.	P. A. Garner.
Jefferson.....	Asheville.....	2,900	6	37.1		65	22	5	13	31	3.21		1.20	T.	10	14	2	12	w.	Prof. E. J. Johnson.
Marshall.....	Madison.....	1,646	11	39.6	+ 2.1	67	22	14	13	35	2.62	- 0.68	1.57	0	4	14	2	12	w.	M. L. Church.
Murphy.....	Cherokee.....	1,614	37								6.41	+ 0.35	2.56	0	10	14	6	8	nw.	Miss Victoria Mingus.
Rock House.....	Macon.....	3,100	21	39.8	+ 2.6	62	22	12	13	27	7.57	+ 0.22	2.64	0	8	14	6	8	nw.	Barry C. Hawkins.
Transom.....	Ashe.....	2,600	1	35.4		63	22	4	13	32	2.60		1.00	0	5	18	5	5	w.	S. M. Transou.
Waynesville.....	Haywood.....	2,792	19	39.0	+ 2.4	66	21	9	13	41	4.00	- 0.45	2.00	0	6					Mrs. Charles E. Quinlan.
<i>Virginia.</i>																				
Blacksburg.....	Montgomery.....	2,170	22	35.6	+ 3.7	67	22	6	13	32	2.68	- 0.52	1.14	4.0	9	14	6	8	w.	Agr. Exp. Station.
Burkes Garden.....	Tazwell.....	3,250	18	32.4	+ 2.8	60	19	0	13	39	2.39	- 1.31	0.86	2.0	5	14	7	7	w.	C. H. Greever.
Elk Knob.....	Lee.....	3,243	10	36.4	+ 0.6	65	21	8	13	25	3.89	+ 0.02	1.60	0	7	18	3	7	sw.	Henry Nicoll.
Ivanhoe.....	Wythe.....	2,028	9	35.0		64	22	8	13	32	2.64		0.75	2.5	13	18	3	7	w.	Miss Alice G. Jewett.
Max Meadows.....	do.....	2,028	17	36.1	+ 0.1	63	19†	4	13	39	1.97	- 0.91	0.55	3.0	7	14	3	6	nw.	James M. Graham.
Mendota.....	Washington.....	1,350	4								3.82		1.10	0	10					Frank M. Barker.
Mountain Lake.....	Giles.....	4,348	3								3.01		1.10	4.0	6	18	3	7	n.	H. E. Dorland.
Radford.....	Montgomery.....	1,773	4								3.27		1.60	0	7					Arthur Roberts.
Spears Ferry.....	Scott.....	1,221	17								4.77	+ 0.01	1.26	0	10					Miss L. E. Venable.
Wytheville.....	Wythe.....	2,293	20	36.2	+ 1.1	64	19	9	13	36	2.06	- 2.03	0.85	1.5	8	16	5	7	w.	U. S. Weather Bureau.

•, b, \*, etc., indicate, respectively, 1, 2, 3, etc., days missing from the record.

\*\* Temperature extremes are from observed readings of the dry bulbs; means are computed from observed readings.

† Also on other dates.

T. Precipitation is less than 0.01 inch rain or melted snow.









TABLE 2.—*Daily precipitation for February, 1913. District No. 8—Continued.*

Stations.	Watershed.	Day of month.																												Total.			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28				
<i>North Carolina.</i>																																	
Andrews.....	Tennessee.....			.87	.02																											6.93	
Ashville.....	do.....	T.	.14																													1.59	
Banwers Elk.....	do.....		.32																													3.85	
Blantyre.....	do.....		.80																													3.20	
Blowing Rock.....	Great Kanawha.....																																
Brevard.....	Tennessee.....			.94																													6.63
Bryson City    .....	do.....	47		.52	.30																											6.76	
Cullowhee.....	do.....		.55	T.																												4.13	
Hendersonville.....	do.....		.79																													4.13	
Highlands.....	do.....		.01																													7.65	
Hot Springs.....	do.....		.01																													2.56	
Jefferson.....	Great Kanawha.....		.02																													3.21	
Marshall.....	Tennessee.....			.36																												1.20	
Murphy    .....	do.....		.55	.34	.30																											6.41	
Rock House.....	Savannah.....		T.	.138																												7.57	
Transon.....	Great Kanawha.....			.30	T.																											2.60	
Waynesville    .....	Tennessee.....			.30	.30																											4.00	
<i>Virginia.</i>																																	
Blacksburg.....	Kanawha.....			.25	.03																											2.68	
Burkes Garden.....	Tennessee.....			.50																													2.39
Elk Knob.....	do.....			.65	.02																											3.89	
Ivanhoe    .....	Kanawha.....			.10	.04	.16																										2.64	
Max Meadows.....	do.....		T.	.55																												1.97	
Mendoza    .....	Tennessee.....			.55		.10	.40																								3.82		
Mountain Lake.....	Kanawha.....				.30																											3.01	
Radford    .....	do.....		T.		.30	.40																									3.27		
Speers Ferry    .....	Tennessee.....			.60		.20	.50																								4.77		
Wytheville.....	Kanawha.....		T.			.32																										2.06	

\* Precipitation included in that of the next measurement.

† Separate dates of falls not recorded.

||| Precipitation for the 24 hours ending on the morning when it is measured.

T. Precipitation is less than 0.01 inch rain or melted snow.



TABLE 3.—Maximum and minimum temperatures at selected stations for February, 1913. District No. 3—Continued.

Date.	Kentucky.						Tennessee.										Alabama.		North Carolina.		Virginia.							
	Louisville.		Maysville.		Williamsburg.		Chattanooga.		Johnson City.		Knoxville.		Nashville.		Palmetto.		Sparta.		Waynesboro.		Madison.		Asheville.		Blacksburg.		Wytheville.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1....	19	7	22	8	40	18	41	29	36	35	36	25	35	15	34	22	48	20	37	22	35	27	37	23	29	19	30	19
2....	33	14	37	8	42	11	39	24	51	22	39	23	38	21	38	23	48	21	40	23	46	24	44	24	44	12	44	16
3....	35	25	35	12	46	20	52	36	56	24	49	36	42	32	46	34	49	20	45	33	48	24	56	30	44	30	49	31
4....	30	18	31	14	44	28	45	35	45	33	43	33	41	28	41	29	42	30	42	30	40	26	38	32	39	29	33	28
5....	22	12	27	11	44	20	50	30	45	25	45	28	38	24	43	22	41	22	45	23	46	27	44	26	38	22	39	23
6....	22	9	37	5	32	14	40	26	36	25	35	25	27	17	38	18	34	18	35	18	33	24	36	25	30	24	31	23
7....	27	16	31	6	36	14	40	24	35	21	37	22	32	20	35	19	33	18	44	18	35	22	35	23	32	16	33	18
8....	35	17	39	13	40	16	46	27	35	22	42	24	42	24	45	23	45	18	42	22	23	37	25	37	17	35	19	
9....	36	23	38	16	42	23	49	26	46	18	43	23	40	23	44	20	39	22	46	18	45	23	49	21	42	23	40	22
10....	42	28	40	18	38	24	47	38	46	25	45	34	48	34	44	34	48	29	46	37	50	23	47	32	45	24	45	23
11....	41	22	40	18	45	23	48	39	43	29	46	36	51	29	50	33	49	36	52	36	54	24	54	35	43	33	44	33
12....	22	13	24	17	48	30	39	24	35	29	37	22	30	18	34	22	40	23	37	21	35	25	38	20	42	34	37	15
13....	28	10	32	7	53	31	32	18	34	13	33	16	30	14	36	13	34	14	33	12	32	11	29	15	30	6	30	9
14....	42	19	43	7	62	35	47	22	44	15	43	21	44	18	45	16	41	16	46	11	44	15	40	20	40	14	41	15
15....	53	32	54	12	60	40	54	28	51	20	53	23	55	28	54	27	53	21	56	23	55	20	50	21	48	18	48	21
16....	47	34	40	22	55	38	59	39	51	22	56	37	58	39	62	35	55	29	62	32	59	26	51	25	51	25	47	30
17....	55	40	55	32	64	31	70	44	60	35	67	40	67	49	72	40	64	30	71	39	69	38	61	32	51	30	53	36
18....	69	36	67	25	72	27	70	40	68	29	69	36	70	38	72	36	73	30	70	33	71	40	62	32	42	24	60	26
19....	67	51	70	26	70	29	63	50	64	33	62	39	64	46	63	44	64	49	69	36	61	45	54	34	58	26	64	28
20....	65	51	67	37	72	38	55	47	55	40	57	47	66	50	68	49	63	48	66	41	61	49	51	40	51	38	50	40
21....	67	50	74	37	74	40	61	51	68	37	69	42	63	50	62	53	67	47	63	48	63	50	56	48	52	45	57	46
22....	60	32	58	37	68	38	60	47	65	38	63	42	61	41	60	44	60	48	60	40	64	48	67	44	67	47	63	44
23....	37	24	41	25	58	30	55	38	57	32	53	36	48	32	55	27	55	22	55	24	57	37	52	34	48	31	48	31
24....	31	23	32	23	72	29	46	29	40	35	45	28	40	27	47	26	50	30	48	27	38	33	44	27	36	29	38	23
25....	40	22	41	17	60	35	51	26	47	22	48	23	49	24	55	19	54	18	53	18	55	24	44	22	36	20	29	20
26....	53	36	52	18	61	34	59	42	60	23	62	36	55	46	55	47	55	40	57	44	60	25	52	37	48	26	49	29
27....	57	36	57	37	66	35	66	51	69	40	63	48	61	41	65	51	65	50	62	47	62	49	59	39	62	39	62	39
28....	38	33	41	35	53	43	65	48	64	47	61	46	54	40	62	43	59	44	60	41	60	44	64	46	64	43	59	42
Mns.	41.9	26.2	43.8	19.4	54.2	28.4	51.8	34.9	50.2	28.2	50.0	31.8	48.2	31.0	50.9	31.0	51.0	29.0	51.5	29.4	50.8	30.1	48.4	30.1	44.5	26.6	45.5	26.8

a, b, c, etc., indicate, respectively, 1, 2, 3, etc., days missing from the record.

§§ Instruments are read in the morning; the maximum temperature then read is charged to the preceding day, on which it almost always occurs.